

WHAT IS CLAIMED IS:

1. A positive photosensitive composition comprising:

(A) an acid generator capable of generating an acid upon irradiation with one of an actinic ray and a radiation;

(B) a resin: having a monocyclic or polycyclic alicyclic hydrocarbon structure; and being capable of decomposing by the action of an acid to increase the solubility in an alkali developer;

(C) a basic compound; and

(D) a surfactant containing at least one of a fluorine atom and a silicon atom;

wherein the acid generator (A) comprises at least two compounds selected from the group consisting of a sulfonium salt compound not having an aromatic ring, a triarylsulfonium salt compound, and a compound having a phenacylsulfonium salt structure.

2. The positive photosensitive composition as claimed in claim 1, which comprises (E) a solvent mixture including:

a solvent containing a hydroxyl group; and

a solvent not containing a hydroxyl group.

3. The positive photosensitive composition as claimed in claim 1, wherein the basic compound (C) includes a compound having at least one structure selected from the group consisting of an imidazole structure, a diazabicyclo structure, an onium hydroxide structure, an onium carboxylate structure and an aniline structure.

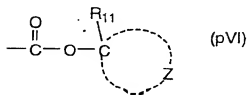
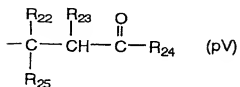
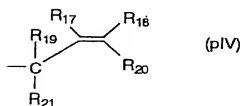
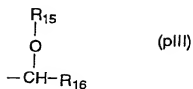
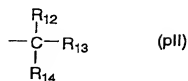
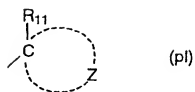
4. The positive photosensitive composition as claimed in claim 1, which further comprises (F) a low molecular weight dissolution-inhibiting compound having: a molecular weight of 3,000 or less; and a group capable of decomposing by the action of an acid to increase the solubility in an alkali developer.

5. The positive photosensitive composition as claimed in claim 1, wherein the acid generator (A) comprises the triarylsulfonium salt compound and the compound having a phenacylsulfonium salt structure.

6. The positive photosensitive composition as claimed in claim 1, wherein the acid generator (A) comprises the sulfonium salt compound not having an aromatic ring and the compound having a phenacylsulfonium salt structure.

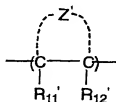
7. The positive photosensitive composition as claimed in claim 1, wherein the acid generator (A) comprises the sulfonium salt compound not having an aromatic ring and the triarylsulfonium salt compound.

8. The positive photosensitive composition as claimed in claim 1, wherein the resin (B) contains at least one selected from the group consisting of: a repeating unit having a partial structure containing an alicyclic hydrocarbon represented by formula (pI), (pII), (pIII), (pIV), (pV) or (pVI) below; and a repeating unit represented by formula (II-AB):



wherein R<sub>11</sub> represents a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, an isobutyl group

or a sec-butyl group; Z represents an atomic group necessary to form an alicyclic hydrocarbon group together with the carbon atom; R<sub>12</sub>, R<sub>13</sub>, R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> each independently represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of R<sub>12</sub>, R<sub>13</sub> and R<sub>14</sub> represents an alicyclic hydrocarbon group, and at least one of R<sub>15</sub> and R<sub>16</sub> represents an alicyclic hydrocarbon group; R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, R<sub>20</sub> and R<sub>21</sub> each independently represents a hydrogen atom, a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, R<sub>20</sub> and R<sub>21</sub> represents an alicyclic hydrocarbon group, and at least one of R<sub>19</sub> and R<sub>21</sub> represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group; and R<sub>22</sub>, R<sub>23</sub>, R<sub>24</sub> and R<sub>25</sub> each independently represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of R<sub>22</sub>, R<sub>23</sub>, R<sub>24</sub> and R<sub>25</sub> represents an alicyclic hydrocarbon group, and R<sub>23</sub> and R<sub>24</sub> may be bonded to each other to form a ring;



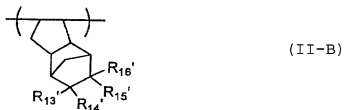
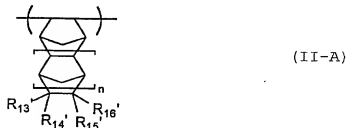
(II-AB)

wherein R<sub>11</sub>' and R<sub>12</sub>' each independently represents a hydrogen atom, a cyano group, a halogen atom, or an alkyl group which may have a substituent; Z' represents an atomic group necessary

to form an alicyclic structure together with the two carbon atoms (C-C), which may have a substituent.

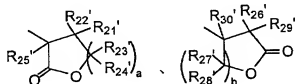
9. The positive photosensitive composition as claimed in claim 8, wherein Z' in formula (II-AB) represents an atomic group necessary to form a bridge-containing alicyclic structure together with the two carbon atoms (C-C), which may have a substituent.

10. The positive photosensitive composition as claimed in claim 8, wherein the compound represented by formula (II-AB) is represented by formula (II-A) or (II-B):



wherein R<sub>13</sub>', R<sub>14</sub>', R<sub>15</sub>' and R<sub>16</sub>' each independently represents a hydrogen atom, a halogen atom, a cyano group, -COOH, -COOR<sub>5</sub>, a group which decomposes by the action of an acid, -C(=O)-X-A'-R<sub>17</sub>', an alkyl group which may have a substituent, or an alicyclic

hydrocarbon group which may have a substituent;  $R_5$  represents an alkyl group which may have a substituent, a cyclic hydrocarbon group which may have a substituent, or a  $-Y$  group shown below;  $X$  represents an oxygen atom, a sulfur atom,  $-NH-$ ,  $-NHSO_2-$  or  $-NHSO_2NH-$ ;  $A'$  represents a single bond or a divalent linking group; at least two of  $R_{13}'$ ,  $R_{14}'$ ,  $R_{15}'$  and  $R_{16}'$  may be bonded to each other to form a ring;  $n$  represents 0 or 1;  $R_{17}'$  represents  $-COOH$ ,  $-COOR_5$ ,  $-CN$ , a hydroxyl group, an alkoxy group which may have a substituent,  $-CO-NH-R_6$ ,  $-CO-NH-SO_2-R_6$ , or a  $-Y$  group shown below;  $R_6$  represents an alkyl group which may have a substituent or a cyclic hydrocarbon group which may have a substituent,  $-Y$  group:



wherein  $R_{21}'$  to  $R_{30}'$  each independently represents a hydrogen atom or an alkyl group which may have a substituent, and  $a$  and  $b$  each represents 1 or 2.

11. A positive photosensitive composition comprising:

- (A) a compound capable of generating an acid upon irradiation with one of an actinic ray and a radiation; and
- (B1) a resin capable of increasing the solubility in an alkali developer by the action of an acid, in which the resin

has: a repeating unit having a group represented by formula (V-1), (V-2), (V-3) or (V-4) below; and an aliphatic cyclic hydrocarbon group:

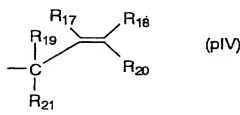
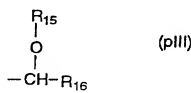
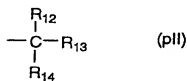


wherein  $R_{1b}$ ,  $R_{2b}$ ,  $R_{3b}$ ,  $R_{4b}$  and  $R_{5b}$  each independently represents a hydrogen atom, an alkyl group which may have a substituent, a cycloalkyl group which may have a substituent, or an alkenyl group which may have a substituent; two of  $R_{1b}$ ,  $R_{2b}$ ,  $R_{3b}$ ,  $R_{4b}$  and  $R_{5b}$  may be bonded to form a ring,

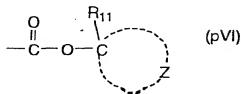
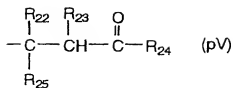
wherein the acid generator (A) comprises at least two compounds selected from the group consisting of a triarylsulfonium

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(pI)







wherein  $\text{R}_{11}$  represents a methyl group, an ethyl group, an n-propyl group, an isopropyl group, an n-butyl group, an isobutyl group or a sec-butyl group; Z represents an atomic group necessary to form an alicyclic hydrocarbon group together with the carbon atom;  $\text{R}_{12}$ ,  $\text{R}_{13}$ ,  $\text{R}_{14}$ ,  $\text{R}_{15}$  and  $\text{R}_{16}$  each independently represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of  $\text{R}_{12}$ ,  $\text{R}_{13}$  and  $\text{R}_{14}$  represents an alicyclic hydrocarbon group, and at least one of  $\text{R}_{15}$  and  $\text{R}_{16}$  represents an alicyclic hydrocarbon group;  $\text{R}_{17}$ ,  $\text{R}_{18}$ ,  $\text{R}_{19}$ ,  $\text{R}_{20}$  and  $\text{R}_{21}$  each independently represents a hydrogen atom, a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of  $\text{R}_{17}$ ,  $\text{R}_{18}$ ,  $\text{R}_{19}$ ,  $\text{R}_{20}$  and  $\text{R}_{21}$  represents an alicyclic hydrocarbon group, and at least one of  $\text{R}_{19}$  and  $\text{R}_{21}$  represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group; and  $\text{R}_{22}$ ,  $\text{R}_{23}$ ,  $\text{R}_{24}$  and  $\text{R}_{25}$  each independently represents a straight chain or branched alkyl group having from 1 to 4 carbon atoms, or an alicyclic hydrocarbon group, provided that at least one of  $\text{R}_{22}$ ,

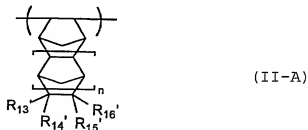
R<sub>23</sub>, R<sub>24</sub> and R<sub>25</sub> represents an alicyclic hydrocarbon group, and R<sub>23</sub> and R<sub>24</sub> may be bonded to each other to form a ring;

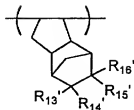


wherein R<sub>11</sub>' and R<sub>12</sub>' each independently represents a hydrogen atom, a cyano group, a halogen atom, or an alkyl group which may have a substituent; Z' represents an atomic group necessary to form an alicyclic structure together with the two carbon atoms (C-C), which may have a substituent.

13. The positive photosensitive composition as claimed in claim 12, wherein Z' in formula (II-AB) represents an atomic group necessary to form a bridge-containing alicyclic structure together with the two carbon atoms (C-C), which may have a substituent.

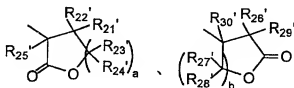
14. The positive photosensitive composition as claimed in claim 12, wherein the compound represented by formula (II-AB) is represented by formula (II-A) or (II-B):





(II-B)

wherein  $R_{13}'$ ,  $R_{14}'$ ,  $R_{15}'$  and  $R_{16}'$  each independently represents a hydrogen atom, a halogen atom, a cyano group,  $-\text{COOH}$ ,  $-\text{COOR}_5$ , a group which decomposes by the action of an acid,  $-\text{C}(=\text{O})-\text{X}-\text{A}'-\text{R}_{17}'$ , an alkyl group which may have a substituent, or an alicyclic hydrocarbon group which may have a substituent;  $R_5$  represents an alkyl group which may have a substituent, a cyclic hydrocarbon group which may have a substituent, or a  $-\text{Y}$  group shown below;  $\text{X}$  represents an oxygen atom, a sulfur atom,  $-\text{NH}-$ ,  $-\text{NHSO}_2-$  or  $-\text{NHSO}_2\text{NH}-$ ;  $\text{A}'$  represents a single bond or a divalent linking group; at least two of  $R_{13}'$ ,  $R_{14}'$ ,  $R_{15}'$  and  $R_{16}'$  may be bonded to each other to form a ring;  $n$  represents 0 or 1;  $R_{17}'$  represents  $-\text{COOH}$ ,  $-\text{COOR}_5$ ,  $-\text{CN}$ , a hydroxyl group, an alkoxyl group which may have a substituent,  $-\text{CO}-\text{NH}-\text{R}_6$ ,  $-\text{CO}-\text{NH}-\text{SO}_2-\text{R}_6$ , or a  $-\text{Y}$  group shown below;  $R_6$  represents an alkyl group which may have a substituent or a cyclic hydrocarbon group which may have a substituent,  $-\text{Y}$  group:



wherein R<sub>21</sub>' to R<sub>30</sub>' each independently represents a hydrogen atom or an alkyl group which may have a substituent, and a and b each represents 1 or 2.

15 The positive photosensitive composition as claimed in claim 11, which further comprises (C) a surfactant containing at least one of a fluorine atom and a silicon atom.

16. The positive photosensitive composition as claimed in claim 11, which further comprises (D) a solvent mixture containing:

at least one solvent selected from the solvent group A below; and

at least one of a solvent selected from the solvent group B below, and a solvent selected from the solvent group C:

group A: propylene glycol monoalkyl ether acylate,

group B: propylene glycol monoalkyl ether, alkyl lactate and alkyl alkoxypropionate,

group C:  $\gamma$ -butyrolactone, ethylene carbonate, and propylene carbonate.

17. The positive photosensitive composition as claimed in claim 11, which further comprises (D) a solvent mixture containing:

at least one alkyl lactate; and

at least one of an ester solvent and alkyl

alkoxypropionate.

18. The positive photosensitive composition as claimed in claim 17, wherein the solvent (D) further contains at least one of  $\gamma$ -butyrolactone, ethylene carbonate, and propylene carbonate.

19. The positive photosensitive composition as claimed in claim 11, which further comprises (D) a solvent mixture containing:

at least one solvent selected from the solvent group D below; and

at least one of a solvent selected from the solvent group E, and at a solvent selected from the solvent group F:

group D: heptanone;

group E: propylene glycol monoalkyl ether, alkyl lactate and alkyl alkoxypropionate;

group F:  $\gamma$ -butyrolactone, ethylene carbonate, and propylene carbonate.